Remarks

Assignee appreciates the allowance or indication of allowability of claims 10, 13-15, 18, 19, 21, 26-29, and 39-48.

Assignee notes that the Office Action dated August 15, 2006, represents the ***fifth non-final*** Office Action and that the Office has switched references to reject the claims many times. Assignee requests that the Office conduct a complete and full search to ensure that all pertinent prior art is located and cited.

Assignee continues to believe that certain claims have specific limitations not met by the art references of record that present easy ground for allowance. Accordingly, assignee will address the easiest issues ***first*** in this response, after which assignee will discuss the rest of the claims that remain in dispute.

I. CLAIMS ALLOWABLE FOR SAME REASONS AS THOSE ALLOWED.

Dependent claim 37 adds substantially the same feature as dependent claim 10. For the same reasons given for allowing claim 10, dependent claim 37 ought to be allowable.

Dependent claim 38 adds substantially the same feature as dependent claim 14. For the same reasons given for allowing claim 14, dependent claim 38 ought to be allowable.

Assignee requests indication of allowability of claims 37-38 for those reasons alone.

II. SPECIFIC ELEMENTS NOT FOUND IN COMBINED REFERENCES.

The undersigned hopes to reach quick agreement with the Examiner that the following elements are not found in any of the cited references, requiring allowance of the following additional claims. Careful consideration of this section should narrow the range of disputed issues quite a bit.

A. Claims 12, 24, and 36: These dependent claims specify that "the control circuit is programmed to permit the user to select the sequence of patterns from among: (a) members of an alphanumeric character set; (b) graphical display elements; and (c) animation frames." (Claim 24 has slightly different wording.) Properly interpreted, the claims require the control circuit to be programmed to allow the user to select ***from among all three*** (characters, graphical elements, and animation frames). Also, the claims require

that the control circuit be programmed to allow the user to ***select*** one of the members, elements, or frames, as an individual unit.

The Office Action (pp. 4-5) agrees that Barlow does not disclose these added features but asserts that Orsano has a controller (item 12) and allows (at column 2, lines 51-58) arranging the LED's in patterns, like a cartoon character. Respectfully, the Office has misinterpreted this part of Orsano. At the cited place, Orsano teaches that "the pattern of LEDs 2 may vary," that "colors, LED patterns and ornamentation selected" may be varied to create appeal, and that "incorporating the images of ... cartoon characters and the like to augment the LED display is encouraged." In other words, Orsano teaches drawing a cartoon character on the helmet around the LEDs, or maybe placing the LEDs in the shape of a cartoon character, for the purpose of "augmenting" (that is, adding to) the LED display. Orsano does not teach controlling the LEDs flashing to create animation.

Later in the same patent, Orsano teaches controlling lighting, using a switch to permit variations in the lighting rate or pattern, and mentions that one can "control the lighting of LEDs to form word, design stream of words or the like." [*See* col. 2, line 64 to col. 3, line 3] So, Orsano teaches programming the LEDs to create words or designs. However, nowhere does Orsano teach a controller that allows the user to select pre-programmed ***units***. Claims 12, 24, and 36, as noted above, specify that the user must be able to select units representing individual members of a character set, individual graphic elements, or individual animation frames. Orsano does not teach this feature.

Also, Orsano does not teach having a controller that allows a user to select among characters, graphic elements, or animation frames - nothing is disclosed about any means for choosing among ***all three*** of those.

For those reasons, claims 12, 24, and 36 should be indicated allowable.

With further regard to claim 36, this claim stands rejected only in paragraph 5 of the Office Action (pages 10-11), yet that paragraph does not contain any discussion of claim 36 or where in any of the five combined references cited in that paragraph the elements added by claim 36 is thought to be found.

B. **Claim 16:** This dependent claim specifies that the invention must also include "a programming connector physically coupled to the array and electrically connected to the graphics controller." Properly interpreted, the claim requires a connector that is a "***programming*** connector," that is, a connector that allows the user to ***program*** the graphics controller to which it is electrically connected.

The Office Action, page 5, concedes that "Barlow does not disclose a connector" but argues: "Orsano discloses a connector physically (generator 3B) coupled to the array (LED2) see col. 3, lines 1-18." The Office Action also comments that "Barlow discloses a graphic controller physically fastened coupled electrically connected [sic] to the case as discussed in claim 1."

Respectfully, the Office Action seems to have pieced together a rejection based on combining characteristics of different sorts of elements. The claim requires the presence of a "programming connector" to program the graphics controller. It appears admitted that Barlow doesn't have any programming connector. Orsano has a "connector," but it is not a "programming connector." Rather, Orsano's connector is a ***power*** connector, between an off-substrate generator 3B and LEDs 2. In short, ***neither*** Barlow nor Orsano have a programming connector, thus neither does the combination.

The facts, even if true, that Barlow discloses a graphics controller that is "physically fastened coupled electrically connected to the case" is entirely besides the point. Claim 16 specifies that the "programming connector" is the element that is supposed to be "physically coupled to the array" and also "electrically connected to the graphics controller." The ***graphics controller*** being physically coupled to a ***case*** is beside the point.

For those reasons, claim 16 should be indicated allowable.

C. **Claim 17:** This dependent claim depends on claim 16 and specifies that "the programming connector comprises a light-responsive transducer." The Office Action (page 5) admits that "Barlow does not disclose the programming connector comprises a light responsive transducer." However, the Office Action (page 6) argues: "Orsano discloses in figs. 1-3, the connector comprises a light responsive transducer (because Orsano discloses

the timing of LED 2 lighting may be controlled and the lights may be sequentially lit, see col. 2, lines 59-65)."

Orsano does not disclose any "programming connector," as shown above with respect to claim 16. Orsano discloses a ***power*** connector, as noted above, but even that "connector" is not "light-responsive." The claim element specifies that the ***connector*** must be "responsive" to light - that is, it must react to signals sent to it as light waves. Opto-electronic transducers, for example, pick up and respond to light signals.

For those reasons, claim 17 should be indicated allowable.

D. **Claim 54:** This dependent claim depends on claim 1 and specifies, "wherein the graphics controller is structured to allow driving the array of pixel display elements to scroll a message across the array."

The Office Action (page 10) concedes that "Barlow and Orsano do not disclose the graphics controller is structured to allow driving the display elements to scroll a message across the display window." However, the Office Action continues, "Janney discloses of [sic] pixel display elements to scroll a message across the array (see column 2, lines 57-66)." A motivation is cited to scroll many "characters at a time across the display."

Claim 54 quite specifically describes a graphics controller that ***drives an "array of pixel elements"*** to accomplish scrolling. Contrary to the assumption in the Office Action, Janney does not disclose pixel display elements. Rather, Janney discloses "character display units 32," which are LED or LCD units (like those found in a typical inexpensive calculator). Such units display a character, as a unit, in a fixed position. In Janney, the referenced "scrolling" is done by moving a character from one position to the next. Use of "character display units" will cause a character to "jump" from one character display unit to the next. That is the form of "scrolling" that Janney discloses. By contrast, in the present invention of this claim, because the claim specifies use of an array of ***pixel*** display elements, there is an advantage in producing smooth scrolling of the message.

E. **Claim 30:** This is an independent claim. It requires a "case" (part (a)) that supports both a pixel-based display and a graphics controller (parts (b) and (c)). It further

specifies that there must be "a fastener physically coupled ***to the top of the case***." The intended function is specified in a "whereby" clause and in the specification, *i.e.*, the case can be suspended from the fastener and hung, for example as a Christmas tree ornament.

The Office Action (page 7) concedes: "Barlow and Orsano do not disclose a fastener physically coupled to the top of the case, whereby the case is suspended from the fastener." However, the Office Action argues: "Hawkins discloses in fig. 1-3, a backlight apparatus for a light transmissive ornament having a fastener physically (22) coupled to the top of the case, whereby the case is suspended from the fastener (see col. 5, lines 22-30)."

However, Hawkins does not disclose any "case," as can be seen by the discussion in the Office Action, which identifies the fastener as item 22 but does not identify any element of Hawkins as purporting to be a "case." Neither Barlow nor Orsano, likewise, have a case supporting both a pixel-based display and a graphics controller.

None of the three combined references, alone or in combination, teach a fastener physically coupled to the top of a case that contains both a pixel-based display and a graphics controller. In essence, Hawkins discloses nothing more that the unsurprising fact that top-mounted fasteners were known for tree ornaments. But that does not demonstrate obviousness of the invention as claimed: It would not have been obvious to create a hanging, case-based display that relies on a graphics controlled, pixel-based electronic display device, for use as a tree ornament or the like.

For those reasons, claim 30 and the rejected claims that depend on it, namely claims 31-38, should be allowed.

F. **Claim 34:** This is a dependent claim that adds the requirement "wherein the fastener is a flexible loop." This claim depends on claim 30, so "the fastener" is the top-mounted fastener that supports a case containing both a pixel-based display and a graphics controller.

Again, the Office Action (page 8) concedes that "Barlow and Orsano do not disclose further the fastener is a flexible loop." However, the Office Action contends that Hawkins discloses this element because he says, allegedly, "suspension means may include other

types of simple mechanical structure including, but not limited to Velcro, suction cups or snaps see col. 5, lines 23-33)."

At the cited location, Hawkins says: "In addition to the hanger-shaped attachment/suspension means 22 described above, the attachment/suspension means may include other types of simple mechanical structure ..." as mentioned in the Office Action.

Assignee understands that the fabric half of a Velcro fastener contains a multitude of loops of thread. But nowhere does Hawkins say which part of the Velcro is placed on the suspension means, nor does Hawkins disclose a large Velcro loop. The claim specifies, quite carefully, that "the fastener ***is*** a flexible loop," not that the fastener contains any sort of fabric loops in a flat arrangement (as Velcro normally is arranged). Hawkins does not contain any disclosure of Velcro, or any other sort of fastener, ***being*** a flexible loop.

Moreover, the Office Action mischaracterizes Hawkins' teaching by deleting the critical "in addition to" phrase. Hawkins never says that the ***top-mounted fastener 22*** might be Velcro, suction cups, or snaps. Instead, Hawkins says, "***In addition to***" the top-mounted fastener 22 (which is shown as something that is not a flexible loop), there might be ***another*** fastener, like Velcro, suction cups, or snaps. It would make the most sense for such a supplemental fastener to be attached to the bottom or front surfaces of Hawkins' ornament, as opposed to its top, because there is little room on the top where Velcro might attach. In any event, Hawkins makes no disclosure of any top-mounted fastener that is any kind of "flexible loop."

For those reasons, claim 34 should be indicated allowable.

G. Claim 51: This is a dependent claim that adds that the case of claim 30 (made for being suspended) is shaped like a rectangular prism. This claim stands rejected only in paragraph 5 of the Office Action (pages 10-11), yet that paragraph does not contain any discussion of claim 51 or where in any of the five combined references cited in that paragraph the elements added by claim 51 is thought to be found.

Claim 51 should be allowed or a rejection specified with particularity.

III. DISCUSSION OF CONTINUING DISPUTES RE: CERTAIN CLAIMS.

In two instances, the Office Action reflects continuing discussion of disputes previously identified by assignee with respect to selected claims. Assignee respectfully requests reconsideration of those two points, in view of the remarks that follow. Again, resolution of these issues ought to narrow the scope of the dispute considerably.

A. Claims 2-4, 23, and 31-33: These claims relate to the width of the array as a function of character pitch. As indicated in the claims, applicant has taught that one may achieve surprising results by using narrow displays, which can show one to five alphanumerical characters, not the conventional-width displays, which have more characters. Even if only 1.1 or 1.5 characters, for example, are left showing, the display is readable and can be made particularly suitable for attachment to clothing without being unwieldy, resulting in improved economics. In a display of that sort, an average-length word (five characters) is never visible in its entirety on the display, but surprisingly the inventive display can allow such words to be readable anyway when scrolled at proper speed across the narrow-width display.

Assignee previously provided an illustration to explain why the Office should not make a "altering range can never be patentable" argument: The mere fact that the claims relate to a quantitative difference does not automatically mean that applicants have not made an invention. Take, for example, a motion picture. Although it can be considered as just a slide show run at faster speed, no one would argue that the inventor of the movie could not have received a patent because the invention merely related to a change in speed.

The Office tries to respond to assignee's previous argument, but, in the end, the Action just points out that the cited references "do not disclose that how much of the width and the pitch are displayed" and states that the "Examiner does use the case law to apply 'mere change in range or shape'" to reject the claims. Assignee understands that the Office is using that case law. However, the Office Action does not respond to assignee's points that it is ***inappropriate*** to use such case law.

The general rule about "mere change in range or shape" not providing grounds for patentability does not apply in this case. Assignee has explained that the differences in width are significantly different from ordinary displays, that they create surprising results, that there is no suggestion to alter display width versus character pitch (citing MPEP 2144.05(II)(B)), and that the references do not apply to width in pixel-based displays.

There has been no real response to assignee's arguments. Merely stating that the "examiner does use the case law" about "mere change in range or shape" is no response at all to assignee's point that such usage is improper. Assignee is entitled to acceptance of his arguments or a ***detailed*** explanation for why they are viewed wrong.

Why does the Office contend that the "mere change in range or shape" law applies here, despite assignee's arguments that the law on that subject does not apply?

Does the Office agree with the point, and will it make the requested finding of fact, that the difference in width is significantly different from conventional displays?

Does the Office agree with the point, and will it make the requested finding of fact, that narrowing the display to the claimed range provides surprising results?

Does the Office agree with the point, and will it make the requested finding of fact, that the cited references do not disclose any suggestion for the reader to narrow or expand the number of characters displayed in any way desired?

Assignee eagerly awaits a cogent explanation - in a non-final Office Action - or an indication of allowability of these claims.

B. Claims 22-24: These claims include "means plus function" elements. Assignee has repeatedly pointed out, over a period of five years, that a proper analysis of this type of claim requires comparing the structure in the specification and the structure in the reference and determining whether they are equivalent. Proper claim interpretation of a "means plus function" element requires that the Office interpret the claim element as ***those means disclosed in the specification and equivalents***, *see* 35 U.S.C. §112(6); *In re Donaldson Co.*, 16 F.3d 1189, 29 USPQ2d 1845 (Fed. Cir. 1994).

The previous remarks noted specifically that Janney does not have any "means for displaying a message" ***corresponding to applicant's structure***. The structure corresponding to the "means for displaying a message" is a two-dimensional array of pixel display elements (with respect to claim 22), which can be specifically dimensioned with unconventionally narrow widths, to maximize readability versus cost (with respect to claim 23). *See* part II.D above (showing how Janney lacks this "means").

The Office Action (page 9) repeats the same anticipation rejection based on Janney, and at page 8 acknowledges assignee's argument, but says merely that the examiner "disagrees because Janney discloses ***a means*** for displaying a message, because Janney disclosess an introductory message on its window 30, such as 'LITESIGN' (see col. 2, lines 43-49)." [Emphasis added]

Again, the Office Action merely seems to rest on the argument that Janney has ***some*** "means" ("***a*** means") for displaying a message. That is simply not enough – the Office has the burden of showing why Janney's means ("character display units") is equivalent to the means disclosed in assignee's specification, if it is to maintain the rejection. MPEP 2182 ("under *Donaldson* an examiner carries the initial burden of proof for showing that the prior art structure or step is the same as or equivalent to the structure, material, or acts described in the specification which has been identified as corresponding to the claimed means or step plus function").

Assignee respectfully requests that the Office reconsider these claims using a proper analysis. For the above reasons, claims 22-24 should be allowed. If a rejection is maintained, however, the Office should respond to the comments made over a five-year period, and it should make the action non-final to allow assignee a chance to respond.

IV. CLAIM 1 AND THE REMAINING DEPENDENT CLAIMS.

Claim 1, and dependent claims 5-9, 11, 20, 25, 49, 53, and 55, which depend on claim 1, are the only claims not discussed yet. As to those claims (and all the ones discussed above, too), assignee respectfully requests that the Examiner reconsider and withdraw the rejection based on obviousness over the combination of Barlow and Orsano (as well as with

Janney with respect to certain dependent claims - although the action is unclear on this point), for either or both of two reasons discussed in the sections that follow.

A. The References Do Not Disclose "a regular two-dimensional array of pixel display elements."

All of the claims include the limitation of a 2D array of "pixel display elements." A "pixel" is a picture element of a display that "is divided into" a "grid of pixels of the same size and shape." *See* Graf, *Modern Dictionary of Electronics* (6th ed., 1992), p. 752 (copy attached as Ex. A) (note that the pixels need not be square or rectangular).

In other words, in the context of this invention, "pixel display elements" ***tile an area***, to form a display - they are, in essence, space filling. In assignee's application, like on a computer screen, pixels fill (or nearly fill) the space by having pixels abut adjacent pixels. *See, e.g.*, application Figure 2, illustrating close packing of pixel display elements.

By contrast, Orsano discloses space-separated LEDs. Indeed, in his figures, there is much more space between the LEDs than the LEDs take up themselves. The LEDs are not, therefore, "pixel display elements." Nowhere does Orsano describe or mention pixels or the concept of close-packed or space-filling picture display elements. Indeed, to the contrary, Orsano seems to think of his LEDs as three separate lines of LED, as evidenced by the schematic in his Figure 5b. That contrasts with application Figure 8, assignee's schematic, showing a two-dimensional array of pixel display elements, clearly in 2D form.

The other combined reference, Barlow, similarly does not show any pixels or array of elements. Barlow shows a light shining through a transparency, which shows the image as a whole without any division into picture elements or pixels.

Nor does Janney help fill in the missing element, because that patent does not show a regular array of pixels either - it shows "character display units," which in the illustrated embodiment of LCDs, are made from irregular, not tiled subunits. *See* Part II.D above.

Because none of the cited references disclose this element, all claims are allowable.

B. <u>There is No Proper Motivation to Combine Barlow and Orsano</u>.

Alternatively, the claims should be allowed because an ordinarily skilled artisan at the time of the invention would not have been motivated to combine Barlow with Orsano.

The Office Action (p. 3) states, in essence, that one of ordinary skill in the art would have substituted Orsano's strip LED display into Barlow's wearable printed display system. The motivation stated is "because this would provide the field of LED signage (such as displays used in advertising) to control the lighting of LEDs to form words, design streams of words, or LEDs also used in [sic] incorporated into the subject helmet and displays (see Orsano col. 3, lines 1-4)." With all due respect, assignee does not understand the Office's reasoning. It seems as if the motivation stated is just to achieve the combined result: The rejection seems to say merely that the artisan would have added a matrix display to Barlow because this would use a matrix display. That assumes the conclusion; it is not a properly stated motivation to combine.

Barlow teaches a ***<u>fixed-message</u>*** display system relying on electroluminescence; he shines light through a fixed overlay much as an overhead projector shines light through a transparency. Barlow ***<u>relies</u>*** on the message being fixed - it is significant to his design. The fact that Orsano's teaching that known techniques of forming words could be incorporated into the LED's along his helmet strips does not seem to suggest modifying any fixed-message system, with respect to any message-display article capable of being fastened to clothing like Barlow's. (Note that claim 1 here requires "a fastener physically fastened to the back side of the array and suitable for attachment to a human or human clothing"). Orsano contains no suggestion of applying his helmet-affixed LED strip to clothing, as specified in claim 1, part (d). Thus, the invention seems non-obvious, and all claims should be allowed for this reason as well.

Assignee again respectfully requests reconsideration and allowance. Please call the undersigned if the Examiner has any questions or believes it would be fruitful to discuss this matter to achieve a fair and prompt conclusion to this already delayed application.

Respectfully submitted,

RAPID PROTOTYPES, INC.
by its attorney

Dated: January 12, 2007

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Exhibit A

MODERN DICTIONARY of ELECTRONICS

Rudolf F. Graf

SIXTH EDITION

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Illustrated by: *T.R. Emrick*

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processing. 2. Beginning one instruction sequence before another has been completed. Once a technique used on supercomputers, pipelining is now used to speed execution on machines of all sizes.

pip-matching display — A navigational display in which the received signal appears as a pair of blips. The desired quantity is measured by comparing the characteristics.

pi (π) point—The frequency at which the insertion phase shift of an electric structure is 180° or an integral multiple of 180°.

Pirani gage—A bolometric vacuum gage for measuring pressure. Its operation depends on the thermal conduction of the gas present. The pressure being measured is a function of the resistance of a heated filament, ordinarily over a range of 10^{-1} to 10^{-4} mm Hg.

pirate—An unlicensed, unauthorized, and illegal broadcasting station.

piston—Also called a plunger. In high-frequency communications, a conducting plate that can be moved along the inside of an enclosed transmission path to short out high-frequency currents.

piston action — The movement of a speaker cone of diaphragm when driven at the bass audio frequencies.

piston attenuator—An attenuator generally used at microwave frequencies, the amount of attenuation of which can be varied by moving an output coupling device along its longitudinal axis.

pistonphone—A small chamber equipped with a reciprocating piston of measurable displacement. In this way, a known sound pressure can be established in the chamber.

PIT — Abbreviation for programmable interval timer. An IC chip with a separate clock and several registers, used to count time independently of the MPU, for real-time applications. At the end of a time period, it sets a flag or generates an interrupt, or merely stores the time elapsed.

pitch—1. That attribute of auditory sensation by which sounds may be ordered on a scale extending from low to high (e.g., a musical scale). 2. The distance between two adjacent corresponding threads of a screw measured parallel to the axis. 3. The distance between the peaks of two successive grooves of a disc recording. 4. A term applied to a musical tone that is used as a standard for tuning, singing, etc. Standard U.S. and European pitch is based on A = 440 Hz. When the pitch is raised one octave, the frequency is twice the original.

pitch control—1. A circuit which permits the speed of a tape transport's motor to be varied slightly to raise and lower the musical pitch of the recording or to slightly lengthen or shorten playing time. 2. A circuit which permits a turntable's speed to be varied slightly to raise and lower the musical pitch of the recording being played (hence the name), or to slightly lengthen or shorten playing time.

pitted contact — A contact which has numerous discrete hollows in its surface.

pits—1. Small holes ocurring as imperfections which do not penetrate entirely through the printed element. 2. Depressions produced in metal or ceramic surfaces by nonuniform deposition.

piv — Abbreviation for peak inverse voltage.

pivot—A low-friction bearing in the support of a tonearm that allows it freedom of movement in vertical and horizontal planes. In lower-priced tonearms, it may be a simple point-in-cup pivot. More expensive tonearms usually have precision ball bearings or knife-edge pivots.

pivot & jewel—A method of suspending the moving coil or moving iron vane of a meter in a magnetic field. Glass jewel and steel pivot.

piv rating—*See* PRV Rating.

pixel—Contraction of picture element. 1. A spatial resolution element. It is the smallest distinguishable and resolvable area in an image, as, for example, displayed on a crt monitor. It can also describe the smallest distinguishable variation over time in a signal sequence. (The term pixel is not, strictly speaking, applicable to an analog image, but it is sometimes equated to limiting resolution. In general, however, actual pixel resolution is less than limiting resolution.) 2. The smallest controllable picture element in a digital video image. The crt screen is divided into a rectangular grid of pixels of the same size and shape. In the vertical direction the highest picture resolution occurs when each pixel is one scan line high. Horizontal resolution is typically limited by the speed at which the crt electron gun can switch on and off during a horizontal scan. For square pixels, which are normally more desirable than horizontally elongated rectangles, the smallest possible pixel size is usually determined by this horizontal resolution limit. Normally, a square pixel is two or more scan lines high. (In North America, the standard television picture is normally 525 lines high, though partly cropped.) 3. Picture element or picture cell. A term used to describe the information contained in one unit of display surface. (For example, a horizontal resolution of 1700 pixels per line.) 4. The smallest picture element, made up of tricolor phosphor cells. In raster-scan systems the computer divides the screen into such points whose number depends on the resolution selected. 5. A small element of a scene, or

picture element, in which an average brightness value is determined and used to represent that portion of the scene. Pixels are arranged in a rectangular array to form a complete image of the scene.

PLA — Abbreviation for programmable logic array.

place—*See* Column.

planar — 1. Lying essentially in a single plane. 2. Constructed in layers or planes. 3. A semiconductor fabrication technique which the semiconductor device chips are protected by an oxide passivation layer throughout the various stages of fabrication. The planar process thus represents a synthesis of the separate oxide-layer functions involved in the photolithographic etching of diffusion masking and in chip passivation.

planar ceramic tube—An electron tube constructed with parallel planar electrodes and a ceramic envelope.

planar devices—*See* Planar Process.

planar diffusion — Technique used to manufacture semiconductors having diffused pn junctions. All the junctions emerge at the top surface of the wafer.

planar diode—A diode containing planar electrodes lying in parallel planes.

planar display—A display in which the light-emitting segments or elements are all mounted in a single plane.

planar mask — A shadow or aperture mask which has no curvature; one which is perfectly flat.

planar module — A packaged module wherein the individual components are positioned and terminated flat or parallel with the plane of the substrate.

planar network—A network in which no branches cross when drawn on the same plane.

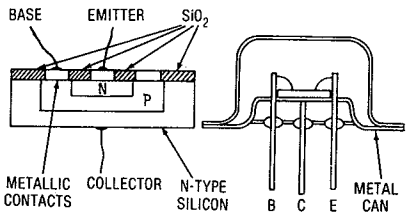
planar process—1. The technology used in fabricating semiconductor devices wherein all pn junctions terminate in the same geometric plane. An oxide is formed at the surface for the purpose of stabilizing the parameters (passivating) . 2. Semiconductor fabrication technology that uses silicon dioxide as a masking agent and produces components on a single plane.

planar silicon photoswitch—Abbreviated PSPS. Essentially a complementary scr. Like the LASCR, it can be triggered by light. In addition, a negative signal (with reference to the anode) at the anode gate terminal can trigger the device.

planar soldering — A soldering method in which the printed-circuit assembly is held loosely in a carrier. This freedom of movement allows the pc assembly to float on the still surface of the solder bath, equalizing the thermogradient throughout the entire assembly.

planar technique — The formation of p-type and/or n-type regions in a semiconductor crystal by diffusing impurity atoms into the crystal through holes in an oxide mask, which is on the surface. The latter is left to protect the junctions so formed against surface contamination.

planar transistor—1. A diffused transistor in which the emitter, base, and collector regions come to the same plane surface. Their junctions are protected by a material such as silicon oxide. The manufacturing process consists of an oxide-masking technique in which the silicon oxide is formed by adding oxygen or water vapor to the atmosphere of a diffusion furnace. The thickness of the oxide layer is a function of time, temperature, and the amount of oxidizing agent. 2. A junction transistor manufactured by a process in which the surface of a chip is passivated with a thin film of oxide, dopants being introduced by successive etching and diffusion.



Planar transistor.

planchet — A small metal container or sample holder for radioactive materials undergoing radiation measurements in a proportional counter or scintillation detector.

Planckian locus — A line drawn on a chromaticity diagram to represent light radiation from a reference blackbody at 2000 to 10,000 kelvins (K).

Planck's constant — Symbolized by *h*. The constant representing the ratio of the energy of any radiation quantum to its frequency. It has the dimension of action (energy × time) and a numerical value of 6.547×10^{-27} erg-second. Its significance was first recognized by the German physicist Max Planck in 1900.

Planck's distribution—An equation that describes the entire distribution of energy radiated from a blackbody as a function of wavelength, based on quantum mechanics.

Planck's radiation law—An expression representing the spectral radiance of a blackbody as a function of the wavelength and temperature.

plane—A screen of magnetic cores. Planes are combined to form stacks.

plane earth—Earth that is considered to